MR2349-843

MARKED-UP VERSION OF AMENDED CLAIM

1. (Amendment) A device with a stator having high performance flat coils comprising:

a stator tooth portion being punched [by] from silicon steel pieces and having a tooth face having a cambered surface, [an] the stator tooth having a tooth root end extending backwards from a center of the cambered surface, [;] a distal end of the tooth root end [being extended outwards] extending outwardly with a tooth root distal end [which] that is not larger than a maximum width of the tooth root end;

a [T shape] wire groove seat [being made] formed by an insulator and having a [T shape;] T-shaped contour, the wire grove seat having a longitudinally extended vertical post [thereof providing to be engaged with the coils] for receiving a respective coil of a motor or a generator and defining an axis thereof, [;] an interior of the longitudinally extended vertical post being hollow and being engagable with the stator tooth root end, [;] and the hollow portion being a hollow end of the wire groove seat; and

a flat coil [being] formed as an annulus by a plurality of turns of a helically wound flat wire, the flat coil having an opening through which the longitudinally extended vertical post passes, each of the plurality of turns of the flat wire being wound in a direction normal to the coil axis, the plurality of turns being axially overlaid one upon another, [;] a thickness of the flat wire being [determined by] less than a depth of the

longitudinally extended vertical post of the [T shape] wire groove seat divided by [the] a predetermined number of [winds of] turns of the flat coil corresponding to a rated rotary speed, a [so as to acquire a thickness dividing number; a thickness of the flat wire should be smaller than a thickness dividing number so as to assure that a total thickness of the flat coil after winding is slightly smaller than the depth of the longitudinal vertical post of the T shape wire groove seat; the] width of the flat coil being [slightly] smaller than a width of [the] a winding space of the [T shape] wire groove seat, [; the flat wire being used in a standing form and being used with a "winding machine" for winding with a layer or multiple layer of windings; the shaped flat coil being further engaged with the longitudinal vertical post of the T shape wire groove seat; and moreover,] a distal axial end of the flat coil being installed with an insulating piece.

REMARKS

This case has been carefully reviewed and analyzed in view of the Official Action dated 1 February 2002. Responsive to the rejections made in the Official Action, Claim 1 has been amended to clarify the combination of elements which form the invention of the subject Patent Application. Further, Claims 2-7 have been canceled by this Amendment.

In the Official Action, the Examiner rejected Claims 1-7 under 35 U.S.C. § 112, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Examiner indicated a number of terms which were unclear and confusing.

Amended Claim 1 corrects those language deficiencies kindly noted by the Examiner. It is believed that amended Claim 1 particularly points out and distinctly claims the subject matter which Applicant regards as the invention.

In the Official Action, the Examiner rejected Claim 1 under 35 U.S.C. § 103, as being unpatentable over Baronosky, et al., U.S. Patent #5,866,965, in view of Applicant's admitted prior art, FIGS. 8A-8H, and Boyd, Jr., U.S. Patent #4,685,201. The Examiner stated that the Baronosky, et al. reference disclosed a stator core of a motor having integral closed and inseparable inner stator teeth, wherein each tooth has a flat coil formed of a flat wire wound around. The Examiner further stated that the reference substantially disclosed all aspects of the invention, except the limitation of:

(a) the stator teeth being formed by single removable teeth with a T-shape insulator and a longitudinal vertical post;

(b) one end of the flat wire being provided with an insulator piece;

(c) the thickness of the flat coil being determined in relation to the thickness dividing number which is a division of the vertical post's depth by the number of winds of a rated rotary speed of the machine; and,

(d) the flat coil being an exciting coil or an induced coil in a generator.

The Examiner then stated that Applicant's admitted prior art disclosed a stator having removable teeth, each having a T-shape insulator and a longitudinal vertical post. The Examiner then stated that the removable teeth facilitate the winding assembly process of the machine while the insulator and the longitudinal vertical post are for the wire insulating support. The Examiner then concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the motor of Baronosky, et al. by configuring each of the stator teeth as a single removable tooth having a T-shape insulator and a longitudinal vertical post. The Examiner then referred to the Boyd, Jr. reference as disclosing a magnetic core winding assembly having a wire end provided with a piece of insulator tube for insulating and protecting the wire lead from potential damage. The Examiner then further concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the motor of Baronosky, et al. by providing an insulating piece at a distal end of the wire. Still further, the Examiner stated

that the Baronosky, et al. reference does not disclose the use of flat wire in the stator having a particular thickness, as claimed. However, the Examiner concludes that one skilled in the art would realize that the vertical post's depth or the number of winds of the rated rotary speed are a matter of obvious engineering design choice based on a particular industrial application of the machine. The Examiner therefore concludes that the claimed thickness dividing number for determining the thickness of the flat wire is a matter of obvious engineering design choice.

The invention of the subject Patent Application is directed to a stator having high performance flat coils and includes a stator tooth portion being punched from silicon steel pieces and having a tooth face having a cambered surface. The stator tooth has a tooth root end extending backwards from a center of the cambered surface. A distal end of the tooth root end extends outwardly with a tooth root distal end that is not larger than a maximum width of the tooth root end. The invention further includes a wire groove seat formed by an insulator having a T-shaped contour. The wire groove seat has a longitudinally extended vertical post for receiving a respective coil of a motor or a generator and defining an axis thereof. An interior of the longitudinally extended vertical post is hollow and is engageable with the stator tooth root end, and the hollow portion is a hollow end of the wire groove seat. The invention also includes a flat coil formed as an annulus by a plurality of turns of a helically wound flat wire. The flat coil has an opening through which the longitudinally extended vertical post passes. Each of the plurality of turns of the flat wire being wound in

a direction normal to the coil axis, with the plurality of turns being axially overlaid one upon another. A thickness of the flat wire is less than a depth of the longitudinally extended vertical post of the wire groove seat divided by a predetermined number of turns of the flat coil corresponding to a rated rotary speed. A width of the flat coil is smaller than a width of a winding space of the wire groove seat. A distal axial end of the flat coil is installed with an insulating piece.

In contradistinction, the Baronosky, et al. reference is directed to a variable reluctance motor having foil wire wound coils. As clearly shown in FIGS. 1 and 4, the foil wire wound coils are not helically wound, the turns of the conductor being arranged coaxial the axis of the coil, as defined by the stator pole 13 upon which the coil is disposed. Whereas in the invention of the subject Patent Application, the flat coils are formed by a plurality of turns of helically wound flat wire, each of the plurality of turns of the flat wire being wound in a direction normal to the coil axis. The helically wound turns are wound so that the turns are axially overlaid one upon another.

With respect to the thickness of the flat wire which forms the coils, the reference is silent as to any relationship between any spacing in the stator and the rotational speed of the machine. Thus, Baronosky, et al. cannot make obvious the invention of the subject Patent Application, as now claimed.

The admitted prior art does not overcome the deficiencies of Baronosky, et al. The admitted prior art is directed to a prior art stator structure wherein conventional wire having

a circular cross-sectional area is utilized to form the coils. However, because of the circular cross-sectional contour of the wire, much space is wasted and the stator spacing is not utilized efficiently. Therefore, the Baronosky, et al. reference cannot make obvious the invention of the subject Patent Application, as now claimed.

Thus, the combination of Baronosky, et al. and the admitted prior art cannot make obvious the invention of the subject Patent Application.

The Boyd, Jr. reference does not overcome the deficiencies of Baronosky, et al. or Baronosky, et al. combined with the admitted prior art. The Boyd, Jr. reference discloses a method for assembling a stator. While the reference discloses the use of elongate insulating tubes 19, such has nothing to do with the claimed insulating piece of the invention of the subject Patent Application. In the invention of the subject Patent Application, an insulating piece 212 overlays the distal axial end of the flat coil which is installed on the longitudinally extended vertical post. Thus, the combination of the wire groove seat and insulating piece provide a nonconductive support structure for the flat coil. Therefore, the combination of Baronosky, et al. and Boyd, Jr., or Baronosky, et al., the admitted prior art and Boyd, Jr., cannot make obvious the invention of the subject Patent Application, as now claimed.

The arrangement of the invention of the subject Patent Application wherein the flat wire is wrapped so that each turn is in a direction normal to the axis of the coil, wherein the turns are helically wound so that the turns are axially overlaid one upon another provides a

coil structure which maximizes the utilization of stator space. By the inventive method of determining flat wire thickness, the current carrying capacity of the coil is maximized for the available space and designed rotational speed of the machine. Nowhere do any of the references, either alone or in combination, disclose or suggest such an arrangement.

It is therefore believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,
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Dated: 31 May 2002

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